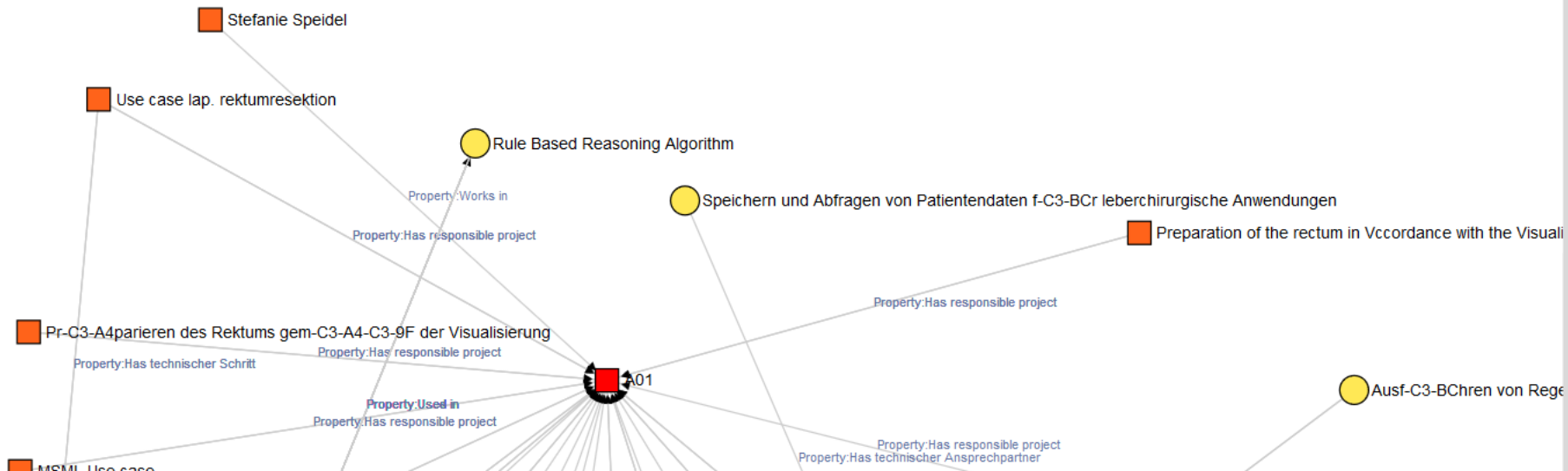


Visualization of Semantic Relations: The Knowledge Base Visualizer

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Using the example of the SMW Surgipedia



Motivation

- Surgipedia is a SMW to organize and structure knowledge and terminologies of „SFB/Cognition-Guided Surgery“
- Many Semantic Relations, authors, pages,...
- Emerging Questions:
 - Which Ontologies are widely spread and used?
 - Who is working on project A, B, C...?
 - What are the most interconnected people on the SMW?
 - ...



The answers are already stored in semantic relations. But not easily readable.

■ SPARQL-Input: („Show all participants connected with project A01“)

```
PREFIX surgi:<http://surgipedia.sfb125.de/wiki/Special:URIResolver/>
SELECT ((?firstLevelNode)) as ?nodetitle (?firstLevelNode) as ?nodeuri
(if(?type=surgi:Category-3ASFB_participant,"rect","circle")) as ?shape
(if(?type=surgi:Category-3ASFB_participant,"#ff0000","#0000ff")) as
?color WHERE {
    ?firstLevelNode ?firstLink ?target .
    ?firstLevelNode rdf:type ?type
    FILTER ((?type = surgi:Category-3ASFB_participant OR ?type =
<http://semantic-mediawiki.org/swikt/1.0#Subject>) AND
(?target=surgi:A01 OR ?firstLevelNode=surgi:A01))
} LIMIT 100
```

■ Output:

nodetitle	nodeuri
http://surgipedia.sfb125.de/wiki/Special:URIResolver/User-3AMartin_Wagner	http://surgipedia.sfb125.de/wiki/Special:URIResolver/User-3AMartin_Wagner
http://surgipedia.sfb125.de/wiki/Special:URIResolver/User-3ADarko_Katic	http://surgipedia.sfb125.de/wiki/Special:URIResolver/User-3ADarko_Katic
http://surgipedia.sfb125.de/wiki/Special:URIResolver/Martin_Wagner	http://surgipedia.sfb125.de/wiki/Special:URIResolver/Martin_Wagner
http://surgipedia.sfb125.de/wiki/Special:URIResolver/Darko_Katic	http://surgipedia.sfb125.de/wiki/Special:URIResolver/Darko_Katic
http://surgipedia.sfb125.de/wiki/Special:URIResolver/User-3AStefanie_Speidel	http://surgipedia.sfb125.de/wiki/Special:URIResolver/User-3AStefanie_Speidel
http://surgipedia.sfb125.de/wiki/Special:URIResolver/A01	http://surgipedia.sfb125.de/wiki/Special:URIResolver/A01
http://surgipedia.sfb125.de/wiki/Special:URIResolver/A01	http://surgipedia.sfb125.de/wiki/Special:URIResolver/A01
http://surgipedia.sfb125.de/wiki/Special:URIResolver/A01	http://surgipedia.sfb125.de/wiki/Special:URIResolver/A01
http://surgipedia.sfb125.de/wiki/Special:URIResolver/A01	http://surgipedia.sfb125.de/wiki/Special:URIResolver/A01
http://surgipedia.sfb125.de/wiki/Special:URIResolver/A01	http://surgipedia.sfb125.de/wiki/Special:URIResolver/A01
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http://surgipedia.sfb125.de/wiki/Special:URIResolver/A01	http://surgipedia.sfb125.de/wiki/Special:URIResolver/A01
http://surgipedia.sfb125.de/wiki/Special:URIResolver/A01	http://surgipedia.sfb125.de/wiki/Special:URIResolver/A01

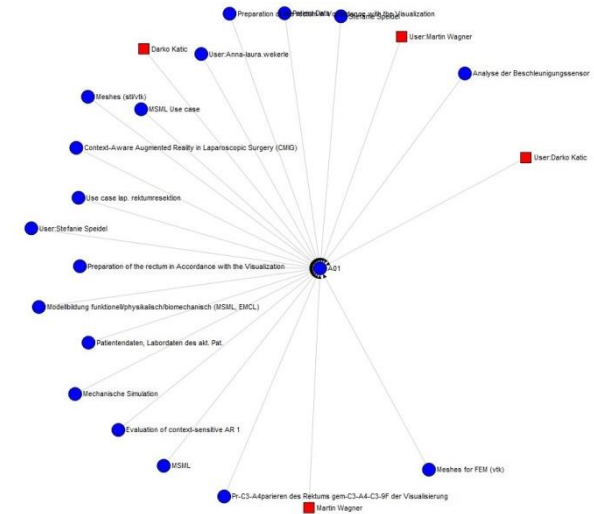
Idea: Visualizing SPARQL-Query-Results in a customizable way.

- Graphs are easier to understand for the human brain than lists
 - BUT: Displayed semantic data has to be **filtered** by use case.
- Visualization has to be very **customizable** to be useful.

Knowledge Base Visualizer - Context

■ Knowledge Base Visualizer is...

- a **tool** to visualize SPARQL-Query results as a graph
- a result of **Seminar Semantic Mediawiki** at the Karlsruhe Institute of Technology, Tutor: Benedikt Kämpgen
- Published on GitHub



Idea: Filtering and customizing Visualization via SPARQL

- Two SPARQL-Queries to filter data:
 - Nodes
 - Links
- Controlling visualization also by SPARQL-Variables
 - Shape
 - Color
 - Size
 - ...

Variables to customize the visualization

■ Nodes:

Variable	Description
Nodeuri	URI of the node
Nodetitle	Displayed Title in graph
shape	Rectangle, circle or ellipse
Color	Hexadecimal color code
size	Displayed size in pixel
priority	Styling priority in case of one node being selected multiple times with different stylings

■ Links:

Variable	Description
source	URI of source node
target	URI of target node
linkuri	URI describing the link type
linktitle	Displayed link title

Demo - SPQARL

„Show all participants connected to project A01 and mark ASFB-Participants with a red rectangle.“

Node-Query:

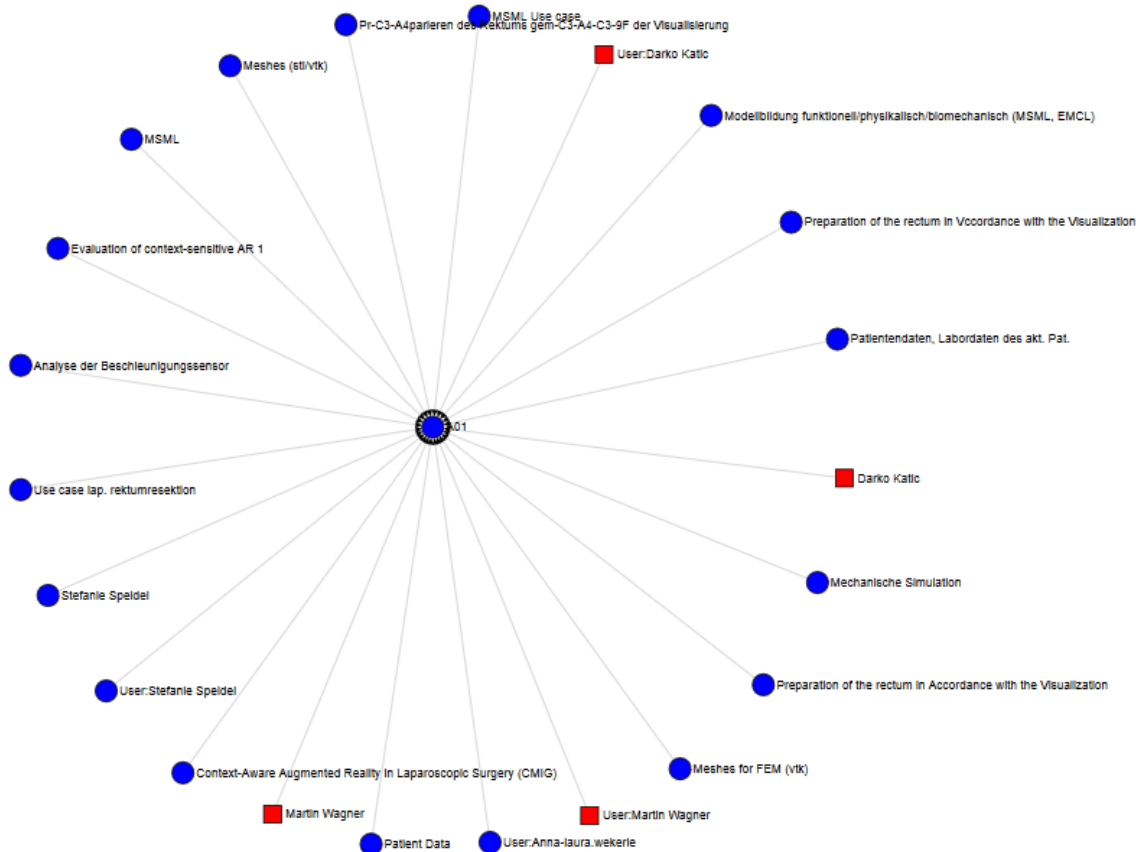
```
PREFIX surgi:http://surgipedia.sfb125.de/wiki/Special:URIResolver/
SELECT ((?firstLevelNode)) as ?nodetitle (?firstLevelNode) as ?nodeuri
(if(?type=surgi:Category-3ASFB_participant,"rect","circle")) as ?shape
(if(?type=surgi:Category-3ASFB_participant,"#ff0000","#0000ff")) as
?color WHERE {
    ?firstLevelNode ?firstLink ?target .
    ?firstLevelNode rdf:type ?type
    FILTER ((?type = surgi:Category-3ASFB_participant OR ?type =<http://semantic-mediawiki.org/swivt/1.0#Subject>) AND
    (?target=surgi:A01 OR ?firstLevelNode=surgi:A01))
}
```

Link-Query:

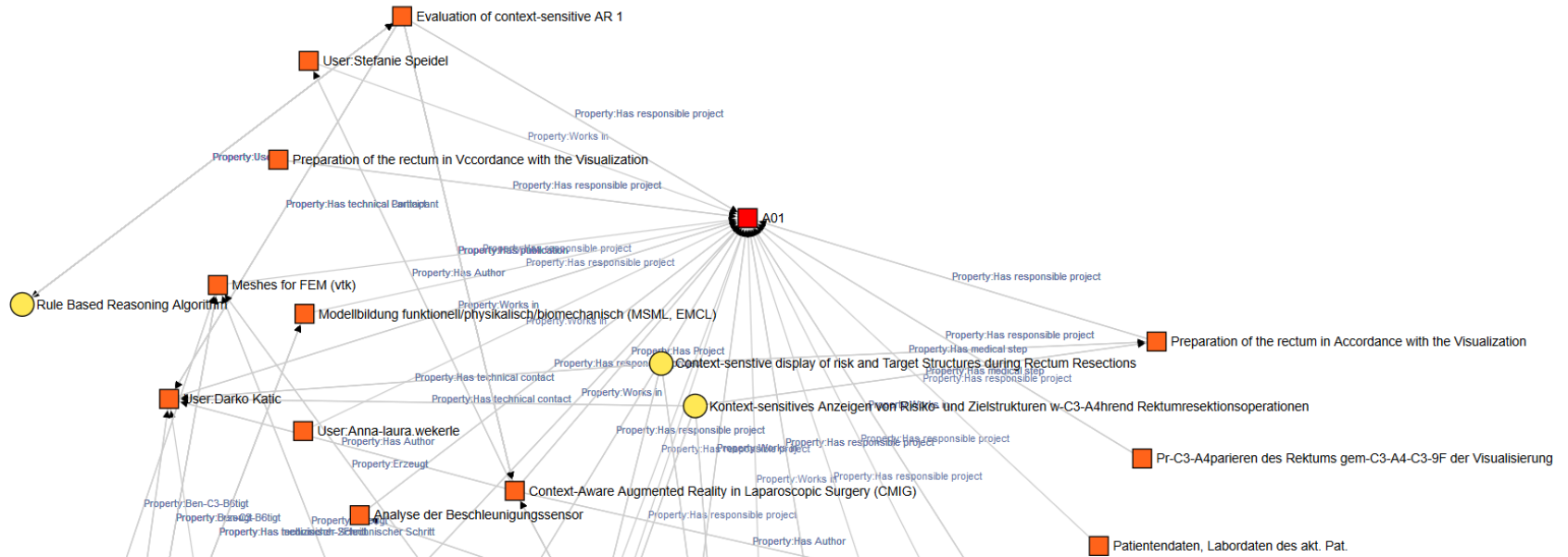
```
PREFIX surgi:http://surgipedia.sfb125.de/wiki/Special:URIResolver/
SELECT ((?firstLevelNode)) as ?source (?target) as ?target (?link) as
?linkuri (?link) as ?linktitle {
    ?firstLevelNode ?link $target .
    FILTER (?target = surgi:A01)
}
```





Demo - Result

„Show all participants connected to project A01 and mark ASFB-Participants with a red rectangle.“ (Live-Demo)

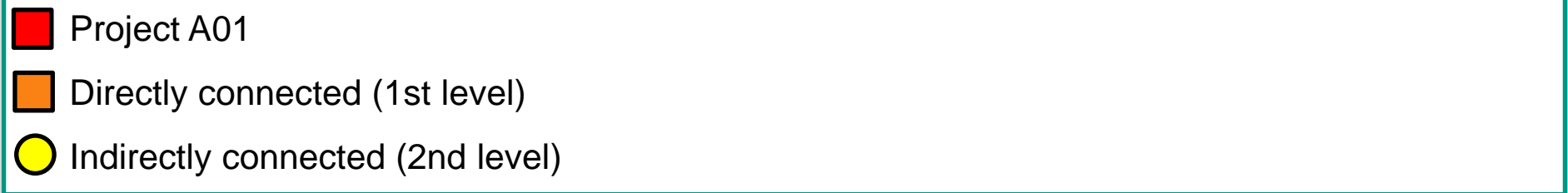


„Show all nodes connected to project A01, recursively up to 2 levels“ (in different colors).
([Live-Demo](#))



-  Project A01
-  Directly connected (1st level)
-  Indirectly connected (2nd level)

(Live-Demo)



Lessons Learned

- Filtering data and customization is key to usefulness
- Large amounts of nodes and links still a challenge
 - Ideas
 - Dynamic frontend filters
 - Manually moving of nodes
- HTML5 and JavaScript Technology is great, but can easily drain the computer's resources

Current State and Discussion

- Current State
 - Functional prototype (Usability and performance improvements)
- Continuing Development is possible
 - Published under Apache License on Github
- Questions?
- Use Cases? Ideas?